

(Effective: November 7, 2012)

## **Education Policy**

### **Purpose and Description**

The purpose of this policy is to clarify the minimum qualifications an applicant needs in order to test for an elevator mechanic license outlined in WAC 296-96-00906 and WAC 296-96-00910.

### **Documented Work Experience**

The elevator rules state that an applicant needs to have a minimum of three years of documented work experience depending upon the category sought. In an effort to clarify the rules, every applicant needs to have 1,800 hours of documented work experience per year working within the conveyance categories 1, 2, 3, 4, 7, and 8. Category 6 shall have 1,200 hours of documented work experience per year.

For example:

An applicant seeking a category 1 elevator license must have three years of documented work experience, which equates to 5,400 hours (1,800 hrs X 3 yrs = 5,400 hours).

### **Obtaining Recommended Educational Credit Requirements**

Elevator companies are responsible for determining the best way to train their employees in order to meet the educational requirements for the particular category of license sought. Any previous educational training for the employee will be taken into consideration when determining the educational requirements. Educational training may be accomplished by one or more of the following methods:

- 1.) Formal college or trade school course work;
- 2.) Online courses both formal and informal;
- 3.) National elevator training programs, such as NEIP or CET/CAT programs through NAEC;
- 4.) Company training programs, including company and manufacturer specific conveyance training; and/or
- 5.) Existing or past educational training, which must be verified to qualify as meeting the licensure educational requirements.

### **Incorporation of Educational Hours with OJT Hours**

Educational credit hours will be considered as part of the overall hours for years of documented work experience. For example, WAC 296-96-00906 requires an applicant

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to have 3 years of documented work experience to qualify for the mechanics exam in category 1. 1,800 hours is equivalent to one year work experience and educational training, therefore a total of 5,400 hours (1,800 hrs/per yr x 3 yrs) of work experience and educational training is needed, which must include a minimum of 432 educational hours. The documented work experience must be actual work on conveyance system installations, maintenance, repair, service and/or testing.

The educational training hours can be cumulative and carried over from year to year until the appropriate number of documented work experience hours can be obtained for the applicant to qualify for the written examination.

## Training

The applicant must provide the department with a complete list of educational training credits and copies of certificates of successful completion before the applicant can take the written examination administered by the department. The department recommends the applicant take the following classes to complete the required number of educational training hours before applying for the written examination:

	License Category						
	1	2	3	4	6	7	8
<b>Required training hours per year:</b>	144	90	90	90	40	40	144
<b>Per WAC 296-96-00906 - number of years of experience needed per category is:</b>	<u>x3</u>	<u>x3</u>	<u>x3</u>	<u>x3</u>	<u>x2</u>	<u>x1</u>	<u>X3</u>
<b>Total hours of training required to qualify to sit for the category mechanic exam:</b>	432	270	270	270	80	40	432

### Course Descriptions:

(Applicant must complete the total number of educational hours specified in the license category of each course).

	Percent of total hours for training emphasis per category						
	5%	8%	8%	8%	10%	15%	8%
	<b>Total educational hours required</b>						
<b>Course 1 Basic Safety, Electricity, Rigging and Hoisting</b>	22	22	22	22	8	6	35
<b>Basic Safety</b>							
(1) Identify Job Hazards							
(2) Proper equipment use							
(3) Common-sense safety around conveyances							
(4) Codes that apply to the elevator industry							

**Basic Electricity**

- (1) Avoiding electrical shocks, GFCI's

**Basic Rigging and Hoisting**

- (1) Safety procedures
- (2) Properly handling and storage of elevator/escalator equipment
- (3) Tie/ID knots, bends and hitches
- (4) Safety procedures for hoistway heavy equipment
- (5) Building safe work platforms and scaffolding
- (6) Use all safety devices

		Percent of total hours for training emphasis per category						
		11%	10%	13%	13%	10%	15%	15%
		Total educational hours required						
<b>Course 2</b>	<b>Basic Introduction to Maintenance Practices</b>	48	27	35	35	8	6	65
	(1) Intro to A17.1 Section 8.6 and A18.1 Section 10							
	(2) Test and Intervals per A17.1 section 10							
	(3) Maintenance Control Programs							
	(4) Logs and Records							

		Percent of total hours for training emphasis per category						
		15%	13%	15%	15%	13%	15%	15%
		Total educational hours required						
<b>Course 3</b>	<b>Electrical Theory, Electronics, and Electrical Operation</b>	65	35	40	40	10	6	65
	<b>Electrical Theory</b>							
	(1) AC and DC principals and concepts							
	(2) Schematic and print reading.							
	(3) Symbols & terminology							
	(4) Basic safety practices when working with electricity							
	<b>Solid State Electronics</b>							
	(1) Terminology and safety equipment used on electronic devices							
	(2) Binary & hexadecimal							

- systems as related to digital circuitry
- (3) Capacitors and capacitance used on elevator equipment
- (4) Inductance and inductors used in circuits
- (5) How a semi-conductor works
- (6) Diode, zener diodes, photodiodes and LED's
- (7) Transistors and how they operate
- (8) How SCR's are operated and used in elevator circuits
- (9) Digital gates and their functions
- (10) Integrated power supplies
- (11) Configurations and uses of the Op Amp
- (12) Relay logic

**Circuit Tracing / Relay Logic**

- (1) Wiring diagrams, symbols, and how to apply them to the equipment
- (2) Sequence of operation of individual circuits
- (3) Procedures for troubleshooting malfunctioning circuits
- (4) Locate and repair electrical problems such as open grounds, defective contacts and coils, etc.
- (5) Understanding variable frequency drives, PLC's and transformers

**Motors & Controllers**

- (1) Testing and replacing motors and generators
- (2) Turn and undercut a commutator
- (3) Test shunt trip and series field coils

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		Percent of total hours for training emphasis per category						
		11%	15%	15%	15%	15%	15%	5%
		Total educational hours required						
<b>Course 4</b>	<b>Electrical wiring, equipment, installation and maintenance</b>	47	40	40	40	12	6	22
	<b>Wiring Installation</b>							
	(1) NEC familiarization							
	(2) Terminology for tools and							

- electrical installation/testing equipment
- (3) Plan and install raceway and conduit
- (4) Bending conduit
- (5) Plan wiring and pulling wires safely and efficiently
- (6) Accurately prepare and install traveling cables
- (7) Bonding and grounding equipment
- (8) Prepare the elevator/escalator for running operations
- (9) Traveling cable installation
- (10) Repair and replacement of traveler in existing hoistway

		Percent of total hours for training emphasis per category						
		7%	7%	7%	7%	7%	7%	n/a
		Total educational hours required						
<b>Course 5</b>	<b>Conveyance Safety Test</b>							
	(1) Safety procedures	30	19	19	19	6	3	
	(2) Equipment specific requirements							

		Percent of total hours for training emphasis per category						
		4%	3%	9%	9%	3%	6%	10%
		Total educational hours required						
<b>Course 6</b>	<b>Suspension Maintenance and Testing</b>							
	(1) Safety procedures	17	8	24	24	3	2	43
	(2) Layout and properly align and set equipment							
	(3) Properly align sheaves, tracks, and gears							
	(4) Offset roping							
	(5) Calibrate and tests							
	(6) Proper inspection and maintenance procedures for the equipment							
	(7) Car and counterweight assembly and roping							
	(8) Use of counterweights							
	(9) Proper handling and storage of wire ropes							
	(10) Plan a rope run and learn other methods of installing and re-roping							

- (11) Inspecting for defective rope, selector tape & cable
- (12) Staging and routing ropes, tapes & cables
- (13) Shackling and socketing

		Percent of total hours for training emphasis per category						
		10%	10%	10%	10%	10%	8%	5%
		Total educational hours required						
<b>Course 7</b>	<b>Installation of pits, rails, machine rooms and hoistways</b>	43	27	27	27	8	3	22
	<b>Pit Structures</b>							
	(1) Safety Procedures							
	(2) Introduction to the pit components and their purpose							
	(3) Installation of pit equipment: buffers, compensating sheaves, ropes and chains							
	(4) Testing of pit equipment for proper operation							
	<b>Guide Rails</b>							
	(1) Safety Procedures							
	(2) Prepare rails and rail runs							
	(3) Build templates, drop lines and plumb hoistways of single, multiple or corner post installations							
	(4) Install guide rails							
	(5) Use of rail gauge and align rails							
	<b>Machine Rooms</b>							
	(1) Layout and properly align and set equipment							
	(2) Cleaning and lubrication							

		Percent of total hours for training emphasis per category						
		10%	10%	5%	5%	10%	3%	10%
		Total educational hours required						
<b>Course 8</b>	<b>Hydraulic Theory, Operation, and Installation</b>	43	27	14	14	8	12	43
	<b>Hydraulics</b>							
	(1) Safety Procedures							
	(2) Drill a hole for a hydraulic jack							
	(3) Properly install and plumb the casing and jack with specific tools							

- (4) Layout a pipe run and connections to power unit and jack
- (5) Hydraulic theory and valve operation
- (6) Adjust valves for proper operation
- (7) Troubleshoot and isolate system problems

		Percent of total hours for training emphasis per category						
		10%	10%	5%	5%	10%	3%	10%
		Total educational hours required						
<b>Course 9</b>	<b>Elevator Doors and Door Operators</b>	43    27    14    14    8    2    43						
	<b>Door Installation</b>							
	(1) Safety procedures							
	(2) Terminology for doors and related equipment							
	(3) Install car and hoistway entrances and door equipment accurately							
	(4) Install and adjust elevator doors, gates for passenger, freight & dumbwaiters.							
	<b>Door Operator &amp; Related Equipment</b>							
	(1) Passenger and freight door, gate repairs and replacements							
	(2) Door operators, repair, replacement and adjustments							
	(3) Door protective devices and troubleshooting.							

		Percent of total hours for training emphasis per category						
		6%	4%	5%	5%	4%	5%	10%
		Total educational hours required						
<b>Course 10</b>	<b>Conveyance Installation and Related Construction</b>	26    11    13    13    3    2    43						
	(1) Elevators installation, maintenance & repair							
	(2) Escalators installation, maintenance & repair							
	(3) Dumbwaiters installation, maintenance & repair							
	(4) Stair Lifts installation, maintenance & repair							
	(5) Vertical and incline platform lifts installation,							

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maintenance & repair  
 (6) Trams installation,  
 maintenance & repair

		Percent of total hours for training emphasis per category						
		3%	n/a	n/a	n/a	n/a	n/a	2%
		Total educational hours required						
<b>Course 11</b>	<b>Escalators/Moving Walks Installation, Maintenance and Testing</b>							
	(1) Safety procedures							
	(2) Installation of equipment							
	(3) Repair/replacement of equipment							
	(4) Clean and lubricate							
	(5) Maintenance of equipment							
	(6) Testing of equipment							
		13						8

		Percent of total hours for training emphasis per category						
		8%	10%	8%	8%	8%	8%	10%
		Total educational hours required						
<b>Course 12</b>	<b>Code/Policy Familiarization</b>							
	(1) ASME A17.1							
	(2) ASME A17.3							
	(3) ASME A17.5							
	(4) ASME A18.1							
	(5) NFPA 70 / NEC as applicable							
	(6) A117.1 ADA Requirements							
	(7) WAC							
	(8) OSHA / DOSH as applicable							
	(9) IBC, IRC, IFC as applicable							
		35	27	22	22	6	3	43

On March 1, 2011, temporary licenses will be granted to those individuals that have 75% or more of both documented work experience and educational training within the category they seek.